

Appendix A

Statement of Task and Committee Biosketches

STATEMENT OF TASK

A multidisciplinary committee will independently evaluate the Coeur d'Alene River basin Superfund site in northern Idaho as a case study to examine the U.S. Environmental Protection Agency's (EPA's) scientific and technical practices in Superfund site area characterization, human and ecological risk assessment, remedial planning, and decision making. The committee will assess the adequacy and application of EPA's Superfund guidance—in this case, in terms of currently available scientific and technical knowledge and best practices. Recognizing that substantial actions have already been taken to assess and remedy some of the risks attributable to the Coeur d'Alene site, the committee will strive to provide guidance to facilitate scientifically based and timely decision making for this site in the future. The committee will discuss remedial options but will not recommend a specific remedial strategy for this site.

The committee will assess the scientific and technical aspects of the following:

- Determining the geographical extent of areas contaminated by waste site sources. What types of data and analysis are necessary to assess the extent of contamination? In this case, did the approaches used to collect and analyze the data provide results that adequately support EPA's conclusions? Were the sources, transport, and fate of identified contaminants properly considered?

- Assessing and apportioning risks to humans from multiple contaminant exposures related to waste site sources as well as other sources (for example, lead exposure via soil and house-paint dust). What techniques should be used to identify contaminants of concern and estimate the human health risks attributable to waste site sources? In this case, were risks attributable to sources other than mining and smelting activities adequately analyzed?
- Estimating blood lead levels in children with the integrated exposure uptake biokinetic model. Are the design, input data, and assumptions of this model consistent with current scientific understanding? In this case, was the model appropriately applied given the local and regional characteristics? Were alternative tools appropriately used to assess and interpret the model results?
- Assessing the ecological risk from waste site contaminants in the context of multiple stressors. What are the necessary data and appropriate analyses to estimate the ecological risks attributable to waste site contaminants? In this case, how well were these analyses applied to estimate the risks, including the effects of lead on migratory fowl? Were risks attributable to sources other than mining and smelting activities adequately analyzed?
- Defining the remediation objectives. What factors should be considered in selecting the remediation objectives? In this case, did EPA use an appropriate scientific rationale in selecting the remediation objectives, including the spatial extent and levels of remediation? Was this scientific rationale adequately explained? Were the limitations of the analyses appropriately described?
- Evaluating the remediation approaches. In this case, were the feasibility and potential effectiveness of the remediation plans adequately characterized, given best engineering and risk practices and the site-specific characteristics? Was an adequate set of alternatives considered?
- Lessons from the Coeur d'Alene case that may be applicable to similar Superfund sites. Do new approaches need to be developed in the Superfund program to assess the extent of contamination, the resulting health and ecological risk, and possible remediation strategies where water and/or air have distributed contamination over extensive geographical areas?

COMMITTEE BIOSKETCHES

David J. Tollerud (*Chair*) is professor of public health, medicine, and pharmacology/toxicology at the School of Public Health and Information Sciences, University of Louisville, and chair of the Department of Environ-

mental and Occupational Health Sciences. He holds specialty board certifications in internal medicine, pulmonary and critical care medicine, and occupational medicine. He has extensive experience in epidemiology and population studies, particularly those involving the use of immunological biomarkers, and in environmental and occupational health research focusing on prevention of injury and illness. In addition to his work in public health, he supervises clinical trials data management and data analysis activities for the multidisciplinary Institute for Cellular Therapeutics at the University of Louisville. Dr. Tollerud has a 10-year history of service to the Institute of Medicine and has been a National Academies Fellow. He currently serves as a member of the Board on Health Promotion and Disease Prevention, and he is the Board Liaison to the Committee on Poison Prevention and Control. He served as chair for the Institute of Medicine Committee to Review the Health Effects in Vietnam Veterans of Exposure to Herbicides and the National Research Council Committee to Assess the Distribution and Administration of Potassium Iodide in the Event of a Nuclear Incident. Dr. Tollerud received his MD from Mayo Medical School, his MPH from the Harvard School of Public Health, and his BS in mechanical engineering from Stanford University.

Herbert E. Allen is a professor of environmental engineering at the University of Delaware and director of the Center for the Study of Metals in the Environment. Previously, he was the director of the Environmental Studies Institute and professor of chemistry at Drexel University. Preceding that, he was on the faculty of the Department of Environmental Engineering at the Illinois Institute of Technology. Dr. Allen's research is on the fate and effects of trace metals in aquatic, sediment, and soil environments; bio-availability of trace metals; environmental chemistry; ecological risk assessment; and the development of waste-site-specific criteria. Dr. Allen has served on the National Research Council Committee on Technologies for Cleanup of Subsurface Contaminants in the U.S. Department of Energy Weapons Complex. He received his PhD in environmental chemistry from the University of Michigan.

Lawrence W. Barnthouse is the president and principal scientist of LWB Environmental Services, Inc. His consulting activities include evaluations for nuclear and non-nuclear power plants, Superfund ecological risk assessments, natural resource damage assessments, and risk-based environmental restoration planning. He was formerly at Oak Ridge National Laboratory where he organized an ecological risk assessment group that was responsible for all ecological risk assessments performed on the U.S. Department of Energy sites at Oak Ridge, Tennessee; Portsmouth, Ohio; and Paducah, Kentucky. After leaving Oak Ridge National Laboratory, he was a consul-

tant with McLaren-Hart, Inc., prior to establishing LWB Environmental Services. He is a member of the Atlantic States Marine Fisheries Service Cumulative Impacts Assessment Panel and chair of the Society of Environmental Toxicology and Chemistry's Population-Level Ecological Risk Assessment Work Group. He has served on the National Research Council Board of Environmental Studies and Toxicology and on several National Research Council committees, and was a member of the peer review panel for the U.S. Environmental Protection Agency's Guidelines for Ecological Risk Assessment. Dr. Barnthouse holds a PhD in biology from the University of Chicago.

Corale L. Brierley (NAE) provides technical and business consultation to the mining and chemical industries and government agencies through Brierley Consultancy LLC. Previously, Dr. Brierley worked as chemical microbiologist at New Mexico Institute of Mining and Technology as the chief of environmental process development for Newmont Mining Corporation, as a general partner at Vista Tech Partnership, Ltd., and as the president of Advanced Mineral Technologies. Her research interests include the application of chemical, physical, biological treatment and management of metal-bearing aqueous, solid, and radioactive wastes and biotechnology applied to mine production. She is a member of the Division Review Committee for the Risk Reduction and Environmental Stewardship Division at Los Alamos National Laboratory and is a member of the International Advisory Committee for the Biohydrometallurgy Symposia and the Editorial Board for Hydrometallurgy Journal. Dr. Brierley is a member of the National Academy of Engineering (NAE), serving on the NAE Program Committee and Committee on Membership, and has served on several National Research Council committees, including the Committee on Technology for the Mining Industries, the Committee on Earth Resources, the Committee on Novel Approaches to the Management of Greenhouse Gases, and chaired the Committee to Review the USGS Mineral Resources Program. Dr. Brierley holds a PhD in environmental sciences from the University of Texas at Dallas.

Edwin H. Clark II is president of Clean Sites Inc. in Alexandria, VA. He is the former secretary of natural resources and environmental control for the state of Delaware, vice president of the Conservation Foundation, and associate assistant administrator for pesticides and toxic substances in the U.S. Environmental Protection Agency. He has served as a member of the National Research Council Board on Environmental Studies and Toxicology and on several committees, including the Committee on Risk-Based Criteria for Non-RCRA Hazardous Waste. He holds a PhD in applied economics from Princeton University.

Thomas W. Clarkson (IOM) is the J. Lowell Orbison Distinguished Alumni Professor of Environmental Medicine and Professor of Biochemistry & Biophysics, and Pharmacology & Physiology in the University of Rochester School of Medicine and Dentistry. His research is on the pathways, mechanisms, and disposition of toxic metals in the body to seek a cellular-level understanding of how metals cross diffusion barriers in the body. Much of his recent research has focused on the effects of human exposure to methylmercury. Dr. Clarkson was elected to the Institute of Medicine in 1981. He received his PhD from the University of Manchester and an MD (Honoris causa) from the Umea University School of Medicine, Sweden.

Edmund A.C. Crouch is a senior scientist with Cambridge Environmental, Inc. He has published widely in the areas of environmental quality, risk assessment, and presentation and analysis of uncertainties. He has co-authored a major text in risk assessment, *Risk/Benefit Analysis*. Dr. Crouch serves as an expert advisor to various local and national agencies concerned with public health and the environment and has served on three National Research Council committees. He has written computer programs for the sophisticated analysis of results from carcinogenesis bioassays; has developed algorithms (on the levels of both theory and computer implementation) for the objective quantification of waste site contamination; and has designed Monte Carlo simulations for purposes of fully characterizing uncertainties and variabilities inherent in health risk assessment. He received his PhD from the University of Cambridge, England, in high-energy physics.

Alison C. Cullen is an Associate Professor at University of Washington's Daniel J. Evans School of Public Affairs. Her specialization areas include environmental risk analysis, environmental science and policy, quantitative uncertainty analysis, and statistical decision theory. Previously, she held positions in the Water Quality Branch of EPA and was on the faculty of Harvard University's School of Public Health. Her research involves the analysis of environmental health risk, decision making in the face of risks that are uncertain or varied across populations, and the application of value of information and distributional techniques. She is active in environmental exposure assessment projects in the United States and internationally. Also, she has served as a technical consultant to the Natural Resources Defense Council, the Environmental Defense Fund, and on the Risk Assessment Advisory Committee for the state of California. She holds a ScD from Harvard University School of Public Health.

Joseph H. Graziano is a professor of environmental health sciences and pharmacology and associate dean for research at Columbia University. Previously, he served on the faculties of the Rockefeller University and

Cornell University Medical College. He was the founding director of Columbia University's National Institute of Environmental Health Sciences (NIEHS) Center for Environmental Health in Northern Manhattan. In addition, he was the principal investigator of a 15-year NIEHS-funded prospective study of childhood lead poisoning carried out in the mining town of Kosovska Mitrovica, Yugoslavia. Dr. Graziano is the founding director of the Columbia University Superfund Basic Research Program on health effects and geochemistry of arsenic and lead. Dr. Graziano received his PhD in physiology from Rutgers University.

David L. Johnson is a professor of environmental chemistry at the State University of New York College of Environmental Science and Forestry. His research interests are in the development of analytical techniques for the determination of the chemical and physical forms of heavy metals in soils and atmospheric and aquatic samples, as well as quantitative relationships between soil lead and blood lead. In the past, he worked with the application of automated scanning electron microscopy/image analysis techniques for individual particle analysis. His current activities seek to combine geography with urban geochemistry to study the spatial and temporal resolution needed for addressing pollution abatement and remediation of metals in urban soils and for the creation of geography-based exposure assessments in environmental health studies. Dr. Johnson received his PhD in oceanography from the University of Rhode Island.

Ronald J. Kendall is the founder and director of The Institute of Environmental and Human Health at Texas Tech University and Texas Tech University Health Sciences Center and founding chair and professor of the Department of Environmental Toxicology, Texas Tech University. Dr. Kendall founded and directed The Institute of Wildlife and Environmental Toxicology at Clemson University and was the founding department head of the Department of Environmental Toxicology at Clemson University. He also previously directed the Institute of Wildlife Toxicology and was professor of environmental toxicology at the Huxley College of Environmental Studies at Western Washington University. Dr. Kendall is the past-president of the Society of Environmental Toxicology and Chemistry (SETAC) and has served on its board of directors and executive committee as well as served on the SETAC Foundation for Environmental Education Board of Directors. He was chairman of EPA's Joint Science Advisory Board/Science Advisory Panel Review on Data from Testing of Human Subjects and a member of EPA's Science Advisory Board Mercury Review Subcommittee. Dr. Kendall served as chair of EPA's Scientific Advisory Panel on the Federal Insecticide, Rodenticide, and Fungicide Act (FIFRA). He served on the National Research Council Environmental Status and Trends Program and

the Committee on Risk Assessment Methodologies. Dr. Kendall received his PhD in fisheries and wildlife sciences from Virginia Polytechnic Institute and State University, Blacksburg.

John Kissel is an associate professor in the Department of Environmental and Occupational Health Sciences at the University of Washington, where he is the program director of the Environmental Health Department in the School of Public Health and Community Medicine. His research focuses on human exposure to environmental contaminants, including soil-borne metals such as lead and arsenic. Dr. Kissel's work on human dermal contact has been used in the development of exposure factors used at Superfund and other contaminated sites. Dr. Kissel also conducts research on the predictive capability of regulatory exposure models, including determinations of the relative contributions of the ingestion, inhalation, and dermal absorption routes. Among other honors, he is the past president of the International Society of Exposure Analysis and previously the chair of the Exposure Assessment Specialty Group of the Society for Risk Analysis. His externally funded research history includes projects supported by EPA, the U.S. Department of Energy, and the National Institute of Environmental Health Sciences. Dr. Kissel is an environmental engineer and received his PhD in civil engineering from Stanford University.

Thomas W. LaPoint is a professor in the Department of Biological Sciences and director of the Institute of Applied Sciences at the University of North Texas. Previously, he was a professor in the Department of Biological Sciences and leader of the aquatic toxicology section within the Institute of Environmental and Human Health at Texas Tech University. Prior to that, he was a professor of environmental toxicology and leader of the aquatic toxicology section at the Institute of Wildlife and Environmental Toxicology at Clemson University. In addition, he was the assistant chief biologist at the National Fisheries Contaminant Research Center in Columbia, MO. Dr. LaPoint's primary research and teaching interests are in contaminant effects on freshwater aquatic communities and in understanding linkages among fisheries and benthic population dynamics and how these are influenced by anthropogenic perturbations. He also conducts research on the distribution of chemical pollutants and how they affect community structure and function. Dr. LaPoint holds a PhD in aquatic biology from Idaho State University.

David W. Layton is a senior environmental scientist at Lawrence Livermore National Laboratory (LLNL), University of California. His research at LLNL has focused mainly on assessing health risks of contaminants in environmental media and foods and on the environmental impacts of en-

ergy technologies. In addition, he has broad expertise in applying models to simulate human exposures and uptake of environmental contaminants. His research has included assessments of soil-based exposures of plutonium and uranium and evaluation of cleanup criteria for contaminated soils; assessments of models for predicting chemical exposure and transport; and studies of the penetration and transport of particles to residences. Dr. Layton has also conducted major studies on the environmental chemistry and toxicology of conventional ordnance, field-water quality standards for military personnel, and geothermal energy. At LLNL, he has conducted risk assessments of hazardous gas releases, contamination at a Superfund site and Department of Energy facilities, heterocyclic amines in cooked meats, and nuclear wastes dumped in the Arctic Ocean. To improve exposure assessments for airborne contaminants, he developed a metabolically based model for determining breathing rates. He has also conducted studies on modeling the environmental transport and fate of transportation fuels and associated additives such as ethanol and MTBE. Dr. Layton holds a PhD in water resources administration from the University of Arizona.

C. Herb Ward is the Foyt Family Chair of Engineering at Rice University, where he is also professor and chair of Civil and Environmental Engineering and professor of Ecology and Evolutionary Biology. Dr. Ward has directed the EPA-sponsored National Center for Ground Water Research and the Department of Defense Advanced Applied Environmental Technology Demonstration Facility. He is currently chair of the Scientific Advisory Board of the Strategic Environmental Research and Development Program and chair of the Division Review Committee of the Risk Reduction and Environmental Stewardship Division of the Los Alamos National Laboratory. His research interests include the microbial ecology and bioremediation of hazardous waste sites, aquifer restoration, and environmental remediation technology development. He has chaired National Research Council committees including the Committee on Technologies for Cleanup of Subsurface Contaminants in the U.S. Department of Energy Weapons Complex and the Committee on the Department of Energy-Office of Science and Technology's Peer Review Program and has served on several other NRC committees. He received his PhD degree from Cornell University and an MPH from the University of Texas School of Public Health. He is the founding and current editor-in-chief of the international journal *Environmental Toxicology and Chemistry*, a professional engineer in Texas, and a certified environmental engineer by the American Academy of Environmental Engineers.

Dr. Spencer Wood is a professor in the Department of Geosciences at Boise State University. He has wide-ranging expertise in geology, geomorphology

(including modern erosional and sedimentary processes), seismology, hydrogeology, and tectonics. His current research involves studying the geophysical log expression of lacustrine sedimentary facies of aquifers, researching the geomorphology of floodplains, geologic mapping, and studies of the Quaternary faulting and geomorphic evolution. His recent research support has been provided through the U.S. Geological Survey, the Idaho Department of Water Resources, and Boise State University. Recent field research has involved evaluations of erosional events through analysis of alluvial and lacustrine stratigraphy, analysis of the geologic controls of recharge in river valley groundwater systems, channel morphology and bed materials in riverine systems, and the use of high-resolution geophysics to study the geometry of aquifer systems. Dr. Wood has been participating in geologic investigations for the past 40 years, most recently in Idaho, Thailand, and Nepal. He has multiple peer-reviewed publications and is currently completing a book on the geology of Idaho. Dr. Wood received his MS in geophysics and his PhD in geology from the California Institute of Technology.

Robert Wright is an attending pediatrician at the Children's Hospital in Boston, MA and assistant professor of environmental health at the Harvard School of Public Health. His research focus is in childhood neurodevelopment examining both genetic and environmental predictors of developmental performance, especially relating to using nutritional and toxic metals as predictors of neurodevelopment. Dr. Wright is the principal investigator (PI) or co-PI on several studies funded by the National Institute of Environmental Health Sciences (NIEHS), the National Heart, Lung, and Blood Institute (NHLBI), and the Kresge Center for Environmental Health. He is the project leader in National Institutes of Health-funded study examining a birth cohort in Tar Creek, OK—a Superfund site contaminated with lead and manganese. This study will evaluate health disparities of infant development with an emphasis on genetic susceptibility to lead and manganese exposure. Dr. Wright has published extensively in peer-reviewed journals and books and is board certified in general pediatrics and medical toxicology by the American Board of Pediatrics. He received his MD from the University of Michigan and his MPH from the Harvard School of Public Health.